

Albedo model of glacier surface with weathered ice

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Weathered ice (weathering crust) is porous ice with loosely interlocking crystals on the surface layer of glaciers, and it is produced by differential absorption of radiation energy along boundary between ice grains. Since the albedo of glacier surface with weathered ice is higher than that when the surface is glazed, the production of weathered ice is important for albedo of the glacier surface and surface energy balance. We simulate surface albedo and mass balance of July 1st glacier in China, where weathered ice was observed during summer. When simulating, we assume that the amount of produced weathered ice is the function of solar radiation absorbed into the underlying blue ice, which is covered surface snow and weathered ice layers. The simulated albedo and mass balance are much better than those simulated without the production of weathered ice.